DOCUMENT RESUME

ED 221 799 CG 016 225

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TITLE Behavior Analysis: A Student's Guide.
PUB DATE [80]
NOTE 24p.

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Behavioral Science Research; *Behavior Change; *Behavior Modification; *Change Strategies; College Students; Contingency Management; Data Collection; Extinction (Psychology); Higher Education; *Motivation Techniques; *Operant Conditioning; *Reinforcement; Timeout
IDENTIFIERS *Behavior Analysis

ABSTRACT

This paper provides students with a brief outline of behavioral principles and behavior change techniques, and describes various means of behavior change including operant conditioning. Methods discussed include reinforcement, extinction, punishment, response cost, time-out, overcorrection, training, and data collection for taking a baseline. Prompting techniques are also described. The paper discusses in detail the advantages and disadvantages of various behavioral techniques. A behavior management plan is outlined, and applied behavior analysis research designs are discussed, including the reverse design and the multiple baseline techniques. (JAC)

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BEHAVIOR ANALYSIS: A STUDENT'S GUIDE

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CG 016225

BEHAVIOR ANALYSIS: A STUDENT'S GUIDE

The purpose of this paper is to provide the student with a brief outline of behavioral principles and behavior change techniques. Students interested in a more in-depth discussion of Applied Behavior Analysis should refer to the bibliography at the end of the pamphlet.

Operant Conditioning: The Principles of Behavior

I. Methods of Increasing Behavior

According to the "Law of Effect" behavior is controlled by its consequences. In other words, if something good happens to a person following a particular behavior, he/she will tend to repeat that behavior. If an unpleasant consequence follows a behavior, the behavior will tend not to be repeated.

Example: Babies are frequently taught to wave their arms at an early age. When adults observe the child waving bye-bye, they indulge the child with a copious amount of attention. Thus, the child tends to repeat the waving behavior..

A. Reinforcement: It always refers to an increase in the frequency of the behavior it follows. There is no reference made to an internal state like pleasure.

B. Positive Reinforcement: When a positive reinforcer follows a behavior there is a greater probability of the behavior reoccuring in a similar situation. Positive reinforcement is the single most effective technique employed in the training and treatment of handicapped children.

Example: A kindergardner will not interact with the other children but does seek attention from the teacher. The teacher selectively interacts with the isolated child when the child is interacting with peers. The child is conditioned to interact with the other children in her class.

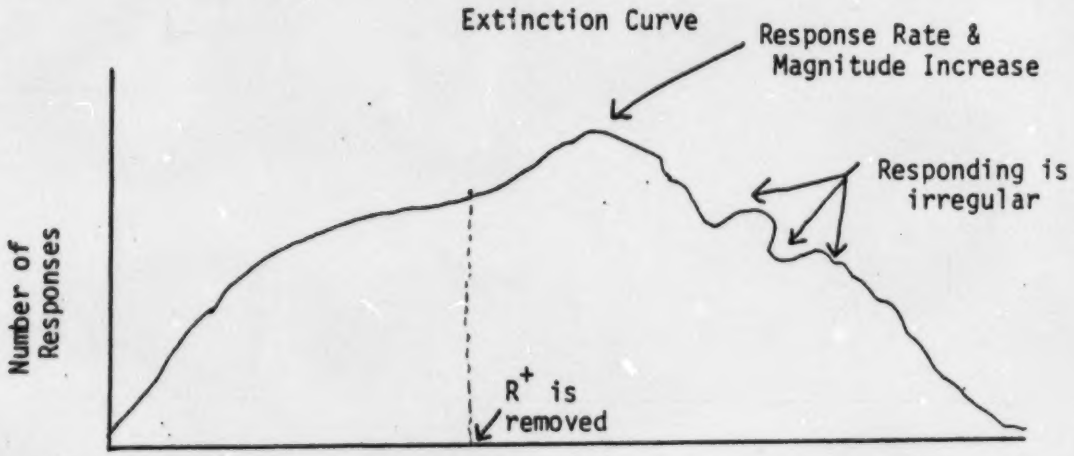
II. Methods of Decreasing Behavior

A. Extinction: The extinction procedure involves removing reinforcement following a behavior that was reinforced in the past.

Example: A nine-month old baby cries each time her parents put her in bed for a nap. Father cannot stand to let the infant cry so he goes to the child's room and rocks her to sleep. The parents report the child's nap time crying is becoming more and more disruptive; what can be done?

The typical extinction procedure involves a gradual decrement in the rate of the behavior until it occurs no more frequently than it did prior to

conditioning. However, sometimes there is an increase in the frequency and magnitude of the behavior immediately following the removal of positive reinforcer.



This increase in frequency and magnitude at the beginning of extinction may cause problems when extinction procedures are attempted on children, or adults, for that matter.

Example: Sandy is a moderately retarded client who is confined to a wheelchair and resident in an MR institution. She has always been able to get out of bed and dress herself but for the last week she has demanded that the staff do these tasks for her. If she did not get help she would throw a tantrum until one of the staff members helped.

The psychologist suggested the following program for Sandy:

a. Ignore her temper tantrums.

b. Praise her for getting out of bed and into her wheelchair and also reinforce her for dressing herself.

Result: The first two days of the program Sandy had a series of tantrums, wet and soiled herself, and ended up spending the entire days in her bed. Her tempestuous behavior confirmed the staff's belief that the psychologist did not know what he was doing. However, the psychologist persuaded the staff to carry out the program for another few days. By the end of the first week Sandy was again preparing herself for the upcoming day.

Facts about extinction:

1. Maximal resistance to extinction occurs with relatively few reinforcements.

2. In continuous or 100% reinforcement extinction occurs faster than in intermittent reinforcement.

Under what conditions should extinction procedures be used?

1. It should only be used for behaviors which are not physically dangerous to the client or others. It is generally not appropriate for the following:

   a. self abusive behavior,
   b. physical aggression toward others,
   c. destruction of property.

2. Extinction is generally most effective for pesty, disruptive behaviors employed by children to gain attention from adults, e.g. talking without being called upon.

   Note how extinction may be used to reduce the crying behavior of the infant mentioned above.

B. Punishment

An event is said to be a punisher only if it results in a reduction of the behavior it follows. Punishment includes either the presentation of an aversive stimulus or the removal of a positive event following a behavior, which reduces the probability of the behavior.

There are really two types of punishment; (1) punishment by application - e.g., spanking, electric shock; or (2) punishment by removal - e.g., time out, response cost, loss of privileges.

The relationship between the two types of reinforcement and the two types of punishment is presented in Table 1.

	Applied	Removed
Positive Reinforcer	(increase) Positive Reinforcement	Punishment (decrease) by Removal
Aversive	(decrease) Punishment by Application	Negative (increase) Reinforcement

The following are conditions that enhance the suppressive effects of punishment:

1. Immediate application or removal of the object or event after the undesired behavior: e.g., spank the child immediately after he runs in the street, not later that same night.

2. Punish the behavior each and every time it occurs. If we automatically received speeding tickets every time we exceeded the speed limit few of us would speed. The current method of punishing speeding behavior is not consistent enough to be effective; therefore most of us speed from time to time.

3. Introduce the punishing stimulus at maximal intensity, rather than with gradual increases in severity.

4. Attempt to remove motivation for the undesired behavior.

5. Train an alternative, acceptable behavior, especially when it is difficult to eliminate motivation for the undesired behavior.

6. Reinforce behaviors which are incompatible with the punished behaviors: e.g., a student that is punished for leaving his seat without permission should be praised for diligently sitting quietly while working on an assignment.

7. Provide the child with a reason for the punishment: e.g., "You hit Timmy, therefore you must sit in the corner."

Possible side effects of punishment:

1. There is increased emotional responding. Animals defecate and show aggression toward others. Children may cry, scream, or behave aggressively.

2. There may be an avoidance of the punishing agent. If one teacher punishes a child frequently, the child may start skipping the class or feigning illness to avoid attending the class.

3. The punishing person may vicariously punish others who have done nothing wrong. Suppose a child answers a question in class and the teacher says, "That was really a terrible answer; you are really a stupid kid!" Will other children be likely to answer the next question?

4. Children may initiate the use of punishment if they observe respected adults using these techniques.

In summary, punishment is a complex topic which continues to receive a great deal of research attention. It may be utilized appropriately for certain behaviors, in particular situations and should be avoided in other situations.

III. The Reduction of Disruptive and Maladapted Behavior: Methods Commonly Employed.

A. Extinction: removal of reinforcement following the occurence of some response which has been reinforced in the past.

B. Response Cost: This means that when a person does an inappropriate behavior something is taken away from the person. The inappropriate behavior costs the individual something.

1. How to use Response Cost.

a. Pick a target behavior you want to teach the client not to do.
b. Decide what you will take away from the client if he does the behavior. Be sure it is something he wants or likes.
c. Whenever the target behavior occurs, immediately take whatever was decided on away from the client.
d. Reward the client when he is not doing the target behavior.

2. Problems with Response Cost.

a. If the client is not on a token system, it may be difficult to find things to take away whenever a target behavior occurs.
b. It is often difficult to take things away immediately after the target behavior occurs.

C. Time-Out: Means that the client is made to spend a certain amount of time in a place where he/she cannot get any rewards.

1. How to use Time-Out:

a. Decide on a target behavior that you want to teach the client not to do.
b. Whenever the target behavior occurs immediately have the client take the time-out.
c. Make rewards available to the client when she/he is not doing the behavior.

2. Points to remember about time-out:

a. The client should not be allowed to leave the time-out until he/she has been relatively quiet for about one minute.

b. The time-out area should be a place where the client will not be rewarded with toys, activities, or attention.

3. Problems with Time Out:

a. Client refuses to go to time-out.
b. Client seems to be reinforced by the attention he/she receives while being placed in time-out.

D. Overcorrection: This technique requires the client to first fix or correct any damages his inappropriate behavior may have done and to either repeat the correction a number of times or correct a number of similar areas or situations.

1. How should overcorrection be used?

   a. Identify the inappropriate target behavior.
   b. Whenever the target behavior occurs, make the client correct any damage his behavior has done.
   c. Make the client repeat the correction several times or make the client correct or fix a similar situation that requires more effort than simply correcting what he did.
   d. Reward the client for not doing the target behavior. Reinforce alternate, incompatible behaviors.

2. When should Overcorrection be used?

   a. Use overcorrection for inappropriate behaviors that have caused some sort of change or damage to the situation which you can make the client fix or correct.

3. Problems with Overcorrection:

   a. The greatest difficulty is that many clients will refuse to do the correction. If you do not feel you are able to make the client do a correction procedure you should use a different technique.
   b. Another problem with overcorrection is that it requires an individual to supervise the procedures (takes staff time).

IV. Development of a Comprehensive Behavior Training Program

A. Teaching New Behaviors: Therapists and teachers are frequently asked to teach handicapped children such behaviors as washing face and hands, toileting, dressing, toothbrushing, eating appropriately, etc. Adult training may involve teaching a handicapped person self-care skills but it also frequently involves occupational training.

The teaching of new behavior will be illustrated via a toothbrush training example.

1. Target the behavior: Toothbrushing: Our client is currently unable to brush his teeth without total assistance.
2. Perform a task analysis:

   a. You must list several steps which are necessary to perform the targeted behavior,

   b. The steps should be as general or specific as necessary for the particular subject with whom you are working.

In general, the more severely handicapped the subject the more detailed the task analysis.

The following represent possible steps involved with toothbrushing:

a. go to the sink,
b. remove cap from paste,
c. put paste on the bruch,
d. put cap on the paste,
e. turn on the water,
f. wet the brush,
g. brush sides of teeth,
h. brush top of teeth,
i. rinse mouth,
j. wipe mouth,
k. rinse brush,
l. turn off water.

3. Take a Baseline: Determine the child's level of competence before the training program is initiated. Find out what he/she cannot do for him/herself. You should also determine how much assistance is needed to perform a step.

4. Develop the training program:

   a. Specify the procedure or procedures employed in your program.

      1. backward chaining
      2. positive reinforcement
      3. shaping
      4. forward chaining

   b. When will training take place?

      1. dressing programs shcuild be conducted during normal dressing and undressing times
      2. eating programs may be implimented during meals

   c. exact programmatic procedures should be delineated.

5. Use prompting when necessary; prompting means to help a person perform a certain behavior.

Four Methods of Prompting

   a. Gesture - a gestural prompt would include pointing, motioning, or looking at something in order to show a client what to do.

      e.g. John is shaving and his trainer says "John shave under your chin" but John does not understand this command so the trainer points to the area under his chin and John completes his job of shaving.

b. Verbal Prompts - This involves telling a client what to do. e.g. "Sandy, put the nut on the bolt," if a verbal prompt is sufficient Sandy will perform the task. If not, the trainer may point to the nut and then to the bolt and thus use a gestural prompt.

c. Demonstration or Modeling - This type of prompting involves going through some of the same motions yourself, that you want the client to do.

e.g. If after verbal and gestural prompts have been insufficient and Bobby has still not washed the backs of his hands, you would take the soap and go through the motions of washing the backs as well as the palms of your hands.

d. Physical Assistance - This involves helping the child do the task or behavior by physically guiding him through it.

e.g. If Bobby still does not wash the backs of his hands, the trainer would put his hands over Bobby's and guide him through the task.

With physical prompts you should only provide as much assistance as is needed to get the child to perform the behavior. If too much assistance is provided, the child will not try to do the behavior on his own.

When Should Prompts be Used? They should only be used when you are certain the child cannot do the behavior himself.

Fading Prompts

Fading Prompts - is the gradual or slow reduction of help you give a child to get him to do a behavior.

Steps in Fading Prompts

1. Gradually reduce giving the physical assistance.

e.g. If you have been helping a child feed himself by putting your hand on his and moving the spoon to his mouth, you may gradually move your hand up his arm, thus providing less and less assistance as he learns the behavior.

2. Gradually reduce the amount of demonstration you have used to get the client to perform the behavior.

3. Gradually reduce the verbal prompts.

4. Gradually reduce the physical gestures which were used to help teach the behavior.

Measurement of Behavior

In order to effect changes in a person's behavior we must be specific

about the behavior in question. Therefore, we must discuss behavior in observable and measurable terms. The behavior must be precisely enough defined so that several people may agree on what constitutes the behavior in question.

The gathering of data is an essential component of the behavior change process because it documents success and indicates when a program is ineffective and requires modification.

Methods of Data Collection

There are five (5) basic types of data collection techniques:

1. Direct Measurement of Permanent Product - examples; Test scores or anything that produces a permanent record.

2. Observational Recording Techniques:

   a. Event Recording - a behavior is recorded each time it occurs. Advantages of this method include: (a) ease of data collection, (b) the total number of occurrances of the targeted behavior is known.

      Disadvantages include: (a) the recorder must watch the subject the whole time he/she is taking data, (b) it is not sensitive to long duration behaviors like a temper tantrum that lasts all day.

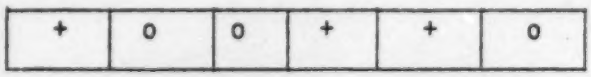
      Example: Johnny's teacher puts a slash next to his name each time he leaves his seat without permission.

   b. Duration Recording: You record how long the behavior occurs after it is initiated. Each time the behavior occurs you record its duration or use a cumulative duration. For example, Sally spent a total of 20 minutes out of her seat today.

      This method is appropriate for infrequent, long duration behaviors, e.g. temper tantrums, out of seat behavior, delay in responding to a command, etc.

      Disadvantages include: (a) you must watch the subject the whole time, (b) it is difficult to use with higher frequency behaviors or behaviors that do not have discrete onsets or offsets. For example, you would not use duration recording for hitting behavior.

   c. Interval Recording - An observational interval is divided into equal parts.



If the behavior occurs at all within the interval it is recorded.

Advantages:

1. Gives an idea of both frequency and duration.

2. Gives an idea of when, in the interval the behavior is most likely to occur. For example, we may find that Johnny talks out of turn most just before lunch.

d. Time Sampling

+	-	-	+	-	+	+	+

At the end of the interval you look at the subject to see if they are engaged in the behavior.

Advantage:

You do not have to observe through the whole interval. e.g., look at the end of an interval is to see if a child is studying.

Disadvantage:

Infrequent, rapidly occurring behaviors may not be sensitively measured by this method. For example, it should not be used with behaviors like hitting.

Inter-rater reliability

This is the degree to which two observers agree on recordings of a single subject behavior.

Example: Interval data on disruptive behavior

D = disruptive behavior
N = no disruptive behavior

Observation #1	D	N	D	N	D	N	
		X	X		X		X represents disagreement between observers
Observation #2	D	D	N	N	N	N	

The rates agreed on three (3) out of six (6) intervals so the percent agreement is 50.

Steps for Programming: An Overview

1. Identify and define the targeted behavior - the behavior your program will attempt to change.

2. Use anecedotal recording to identify the environmental conditions associated with the behavior. Look at what happens immediately before the behavior, and also what happens to the person as a consequence of the behavior.

3. Select the most precise and sensitive method of data collection for your particular behavior.

4. Take baseline data and continue taking baseline until a stable baseline is obtained.

5. Initiate your treatment procedures while you continue recording the target behavior.

The Behavior Management Plan: An Outline of the Procedure

This plan represents a method of using everything learned in this paper to solve behavioral problems.

Steps to Follow

(Refer to the behavior management plan on the following pages)

1. Outline the problem
   ask the following:
   a) Who is causing the problem? 1 subject or several
   b) Where are they causing the problem? Ward, school, workshop
   c) When are they a problem? Morning, afternoon, days when they have no programming (weekends) .

   Following this step you have an idea of the problem behavior, who is causing it, and where and when it occurs.

2. Step #2
   Target or specify the behavior you wish to change.
   example: We decide that we want to decrease Johnny's "aggressive behavior". We have labeled the behavior we wish to change as "aggressive".

   Our next step is to make sure another person can understand what we mean by aggressive behavior.

   Let us say that Johnny bites, scratches, makes faces and swears at his peers. Any of these could be considered aggressive but we wish to stop him from biting and scratching others.

   Now for #2 under step 2 we define aggression as, (1) biting another person to the extent that a bite mark is visible on the victim's skin; (2) scratching another person with fingernails to the extent that a scratch mark is visible on the skin.

Now if we did not know anything at all about Johnny or behavior modification we would still be able to identify and count the number of times, what we call aggressive behavior has occurred.

This is important, because it is essential that everyone be able to identify the behavior in question.

The following are examples of definitions of a Target behavior.

A. We wish to reduce the punishing effects of Helen's Superego.
B. We wish to eliminate Helen's response of crying when she is told to stop swearing.

Which of the above is most useful and would be easily identified by others?

We may not agree on the degree of punishment handed out by a Superego but we can count the number of times a person cries after being told that they can't do something.

3. Observation of Behavior

After we define a behavior to the point that observers agree on whether or not the behavior has occurred we must think about how we can observe the behavior.

When we develop a behavior change program we need evidence that what we are doing is working.

Therefore before we start a program we generally take Baseline data. Baseline data provides us with an indication of how often the behavior occurs before treatment is started.

We compare baseline to treatment data to judge whether or not our program is effective.

The data collection technique which is used should be the one that is easiest and at the same time most sensitive to the behavior under observation.

3. Step #3 Specify the Contingencies

You may use one, two or all three general classes of contingencies (reinforcement, punishment, extinction).

Make sure you specify what the criteria are for delivering the treatment procedure.

Also make sure another person could understand when the treatment should be given.

This part of the program should contain the following:

a. When treatment should be given.
b. How treatment should be administered.
c. Who is responsible for doing the treatment?
d. In what situation is the treatment to be employed.

4. Step #4 Follow-up

The program should specify a follow-up procedure which will be implemented after treatment has been discontinued. This is to ensure that after a problem behavior has been reduced or eliminated and treatment has been stopped, that the behavior does not reappear.

NAME_____

DATE_____

BEHAVIOR MANAGEMENT PLAN

Step #1 ----- Outline the Problem

1. Whose behavior do you wish to change?_____
2. What behavior do you want to increase or decrease?_____

_____

3. In what setting will you work?_____

Step #2 ------ Specify the Behavior

Indicate the behavior to be studied and exactly how to observe it. The observation procedure should be objective enough so a second person could observe it and have a high rate of agreement with you.

1. What "label" will you use to name the behavior or class of behaviors?_____

_____

2. Give a complete definition of the "label" that you will use for the behavior. (Make sure another person would be able to identify the behavior by reading your description.)_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

3. What method will you use for observing the behavior?_____

_____

4. Give a description of your observational methods._____

Step #3 ---- Specify the Contingencies

1. What is the general class of your treatment procedure (reinforcement, punishment, imitation, etc.)?_____
2. What label might you use to name your treatment procedure?_____
3. Give a complete description of your treatment procedure._____

Step #4 --- Follow up

1. State your plan for follow up assessment of the program._____

APPLIED BEHAVIOR ANALYSIS RESEARCH DESIGNS

Since we are not always able to divide groups of subjects into control and experimental groups, we need methods which allow us to assess differences in an individual or one group of individuals.

We will discuss three designs that will allow us to scientifically verify whether or not our procedures are really responsible for changes in behavior.

REVERSAL DESIGN

The reversal design consists of five steps

1. Baseline 1 - operationally define and record the apparent level of the behavior prior to institution of the experimental conditions.

2. Experimental conditions 1 - begin experimental procedures while continuing to record the strength of the behavior.

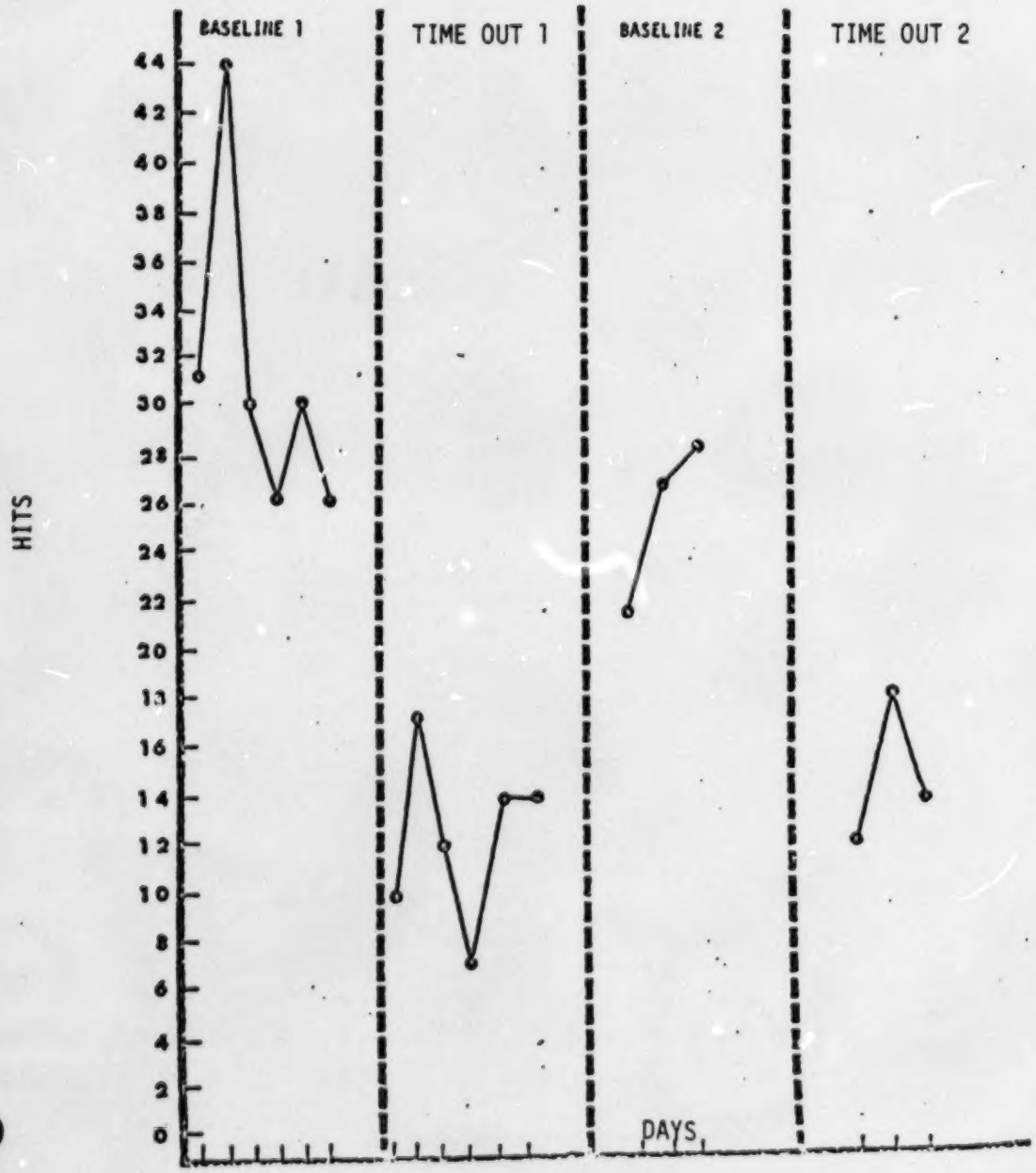
3. Base line 2 - withdraw experimental conditions and continue to measure behavior.

4. Experimental conditions 2 - reinstate the experimental procedures.

5. Post check - periodically measure the behavior beyond the formal end of the experiment to see if behavior levels are being maintained.

See Example 1 - next page.

EXAMPLE I


BASELINE 1
TIME OUT 1
BASELINE 2
TIME OUT 2
HITS
DAYS
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44

Problems with the Reversal Design

1. Changed behaviors sometimes do not reverse when the program is withdrawn. If this happens, can we say our program caused the change in behavior?

2. It may be undesirable to show a reversal in a behavior even if a reversal can be achieved. For example, if severe head banging is stopped it may be unethical to remove treatment.

THE MULTIPLE BASELINE DESIGN

The following steps are used in employing the multiple-baseline design.

1. Baseline

   a. Concurrently record several behavior of one subject or one group.

   b. Record the same behavior of several subjects or groups.

   c. Or, record the same behavior of an individual or group under various stimulus conditions.

   Example:

   a. We may record hitting, biting, and swearing for one subject.

   b. We may record hitting behavior for several subjects on a ward.

   c. We may record Johnny's spitting behavior at school, at home, and in church.

2. Experimental Conditions

   a. Begin experimental conditions with one behavior until a change in that behavior is observed.

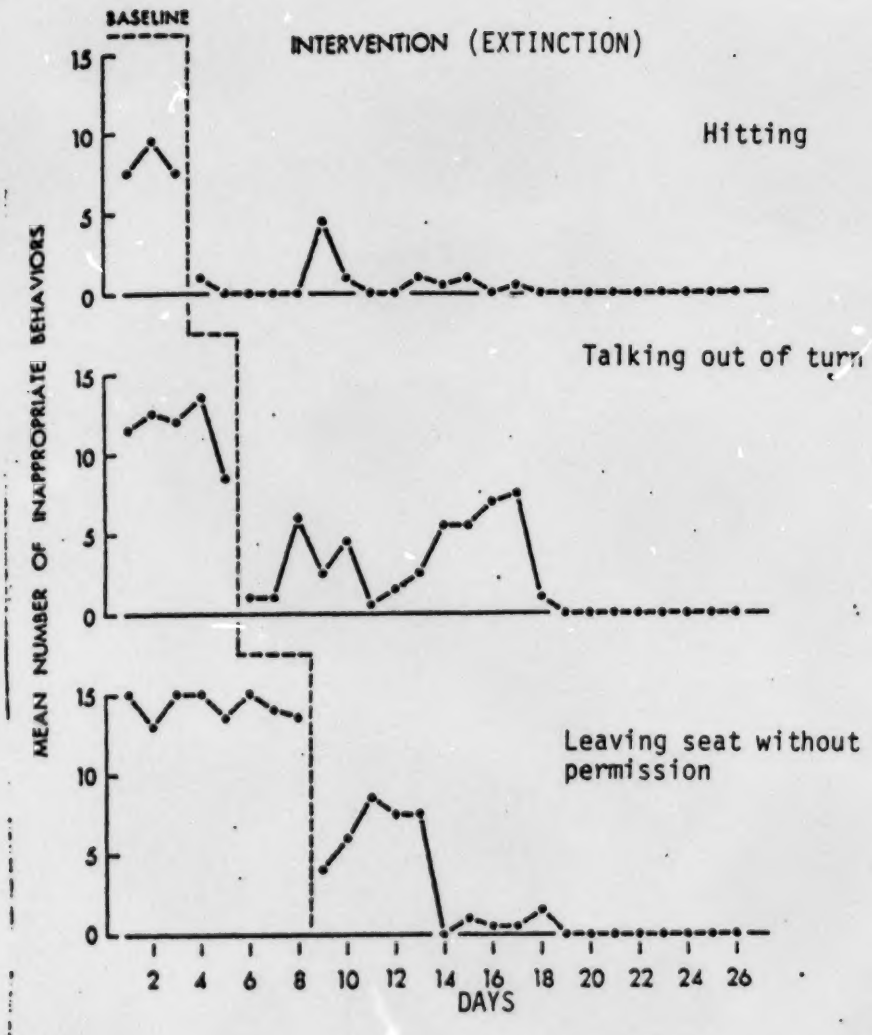
   b. Begin the same experimental procedures with the second behavior.

   c. Successively.

Begin experimental procedures with the third behavior - etc.

Look at Example II on next page.

EXAMPLE II


BASELINE
INTERVENTION (EXTINCTION)
Hitting
Talking out of turn
Leaving seat without permission
MEAN NUMBER OF INAPPROPRIATE BEHAVIORS
15
10
5
0
2 4 6 8 10 12 14 16 18 20 22 24 26
DAYS

Problem with the multiple baseline design.

1. Introduction of the treatment has widespread effects and one behavior change in an individual alters other behaviors as well.

2. Also in a multiple baseline design across individuals, altering the behavior of one individual may change the behavior of others.

Example: If we look at aggression on an institution ward, stopping the aggression of a dominant resident may carry over to other residents via modeling and vicarious conditioning.

3. In the design across situations, behavior change in one situation may carry over (generalize) to other situations.

Example: Johnny's spitting is extinguished in school and its rate is also reduced at home and in church.

Example 2: Johnny also stops hitting after the spitting program is initiated.

THE CHANGING CRITERION DESIGN

1. Begin with a baseline phase - data collected on a single behavior.

2. After baseline is established, the treatment is introduced.

3. As behavior changes the criterion for earning the reward is changed.

Example: A program to reduce caloric intake for a person attempting to lose weight.

Baseline: 4000 calories per day.
Treatment: Subject will receive one dollar per day if they consume less than 3500 calories.

As this criterion is met over a few days it may be adjusted to 3000 or 2700 and so on until the desired caloric intake is set as the criterion.

PROBLEMS AND EVALUATION

The changing criterion design is most suitable for situations where performance can be changed gradually and the final goal is reached in a series of steps.

Where a rapid change in rate of behavior is anticipated this design should probably not be used.

Example: Should not be used for judging the effect of contingent shock on self-abusive behavior.

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